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PART 3

SITE DEVELOPMENT

TABLE OF CONTENTS

	TITLE	PAGE
SECTION I	General	2
SECTION II	Concept Design Requirements	6
SECTION III	Preliminary Design Requirements	10
SECTION IV	Final Design Requirements	11
SECTION V	Foundation Drainage System	14
SECTION VI	Erosion And Sedimentation Control, Storm Water Management, And National Pollutant Discharge Elimination System (NPDES) Permit	14
SECTION VII	Wetlands	15
SECTION VIII	Special Considerations	15
APPENDIX A		16

I GENERAL:

A. A topographic survey is required. This survey should be made on Corps of Engineers mylar drawing sheets. Mylar sizes may be either F Size, 711 mm x 1016 mm (28" x 40"); or D Size (A1), 594 mm x 841 mm (23.39" x 33.11"). Desirable scales of design drawings are as follows:

1. English (in order of preference): 1" = 20', 1" = 30', 1" = 40' and 1" = 50'. Use 1" = 20' and 1" = 30' whenever possible. If the site and utility work cover a large area, use two drawings at the 1" = 20' or 1" = 30' scale. Drawings to a scale of 1" = 10' should be used for small projects.

2. Metric: English metric drawing scales are expressed in non-dimensional ratios. Nine scales are preferred: 1: (full size), 1:100, 1:200, 1:500 and 1:1000. Three others have limited uses: 1:2, 1:25 and 1:250. For metric use a scale of 1:100 should be used for small jobs. Provide a note "All dimensions are shown in meters" or "All dimensions are shown in millimeters."

B. In selecting drawings size for a given project, select a scale on which required work can be clearly and accurately indicated. The survey should be requested and completed prior to initiating concept design. Coordinate all survey requests with the Design Team Leader. The following shall be followed for topographic surveys:

1. General Requirements:

a. All survey work shall be performed under the supervision of a registered land surveyor.

b. Survey accuracy shall be second order.

c. Survey shall be provided in a CADD format compatible with AutoCADD release 14 or with specific User's requirements. See Section 2, Specific Requirements, below for CADD survey format.

d. A preliminary submission is required to review the accuracy, orientation and layout (match lines, etc.) of the survey. At final submission the survey will be provided on 1.44 megabyte floppy disks and on 0.003 inch minimum double matte polyester film K&E Herculene or equivalent, two copies. The Corps will furnish the film and/or a floppy disk with the Corps drawing

border upon request. The final submission will include a copy of all field notes, computations and a points plot.

e. Prior to initiating the survey, contact the Design Team Leader to ascertain that all right-of-entry, passes and badges have been procured and/or the proper personnel notified of the intent to survey.

f. The minimum text sizes for all alpha and numeric characters are: Notes, narrative , and identification words shall be comparable to Leroy size 100. All characters shall be font style "Roman S".

2. Specific Requirements:

a. Survey to the limits required for the design.

b. Scale, contours and spot elevations shall be appropriate to show as much detail as necessary while minimizing sheet count and matchlines. The minimum contour interval is 1-foot in English units and 0.25-meters in metric units. Contour lines shall be continuous joined polylines. Contours shall be 2-Dimensional with X and Y coordinates along the same Z elevation. All contours shall be dashed, approximately 3/8-inch long with every 5-foot or 1-meter contour darkened. Provide spot elevations in sufficient numbers to show all high and low areas and to clearly develop the topography. All major features affecting the topography such as channels, swales, wetlands, waterways, bridges, railroad beds, retaining walls and similar features must be shown.

c. All horizontal control shall be based on the grid coordinate system as specified by the User; if not specified, the control shall be based on the State Grid Coordinate System. All vertical control shall be based on an established USGS benchmark. Indicate coordinate information and elevation for each traverse point and benchmark, grid and grid reference points, north arrow and scales on all drawings.

d. Establish a baseline showing at least 3 control points visible from one another with horizontal and vertical control. Indicate tie-ins for all control points on a separate detail on survey. Provide a small map of the traverse with each point labeled with coordinates and elevations. All new baseline points and traverse points around the site shall be iron pipes or pins.

e. The surveyor is responsible for showing all existing utilities, i.e., aerial, surface, and subsurface. Indicate the type, size, top and all invert elevations, direction of flow, and owner if not on government property.

f. The surveyor is responsible for showing all buildings and structures. Indicate type of construction, i.e., brick, wood, metal, etc. and finish floor elevations.

g. The surveyor is responsible for showing all paved areas. Indicate the type of pavement, with location of curb, gutter and sidewalks. Show all pads, i.e., transformer, fuel tank, etc.

h. The surveyor is responsible for showing the location and the type and size of isolated individual trees, and the existing tree lines.

i. The surveyor is responsible for providing the survey in a format as indicated on the enclosed Legend. AutoCADD layers, line types and colors shall be as specified by the User.

j. The surveyor is required to stake locations of drill holes and other subsurface test locations when indicated on attached plan. Top of drill hole and other test elevations shall also be indicated.

3. Number of Drawings Required: Use a sufficient number of site and utility drawings to clearly indicate work required. A detailed listing of drawings will be given under concept, preliminary, and final design requirements. Remember that it takes less time to clearly present required information on two plans than it does to try and crowd the same information on one plan. In addition, crowding leads to omissions and errors resulting in costly contract modifications.

4. Design Technical Manuals: This is a partial list of manuals which present technical guidance for design of Corps of Engineers projects. In the design analysis cite all references used to prepare the project design. Request all technical manuals from the Design Team Leader.

- TM 5-803-5 Installation Design
- TM 5-810-5 Plumbing

- TM 5-813-5 Water Distribution Systems
- TM 5-813-6 Water Supply for Fire Protection
- TM 5-814-1 Sanitary and Industrial Water Sewers
- TM 5-820-4 Storm Drainage for Areas Other Than Airfield
- TM 5-822-2 Geometric Design of Roads, Streets, Walks, and Open Storage Areas
- Technical Instructions TI 800-01, CEMP-E, dated 20 Jul 1998
- Air Force Design manual - Criteria and Standards for Air Force Construction

Non Government Publications - such as but not limited to:

- American Water Works Association
- National Fire Protection Association
- American Society of Civil Engineers Publications
- Military Handbook - Fire Protection 1008C
- National Standard Plumbing Code
- Applicable Engineering Technical Letters (ETLs) and Engineering Improvement Recommendation System (EIRS) Bulletins.
- DR 1145-1-3, Civilian Regulatory Functions, Department of the Army Permits for Military and Civil Works Construction Activities.
- Installation Design Guides
- Metric Guide for Federal Construction (1st Ed.)

Many ETLs and EIRS Bulletins have been published to provide guidance for specific designs. Some EIRS Bulletins are in Appendix A of this package. During predesign meetings, requests for

pertinent ETLs and EIRS Bulletins should be made from each Design Branch section.

II. CONCEPT DESIGN REQUIREMENTS:

A. Design Analysis: A narrative description of siting requirements for roads, streets, parking facilities, earthwork, utilities and other related site aspects and how you plan to comply with the requirements. This is an excellent way for the designer to explain the rationale for the designs shown on the drawings. The submission of this document, prepared in accordance with ER 1110-345-700, usually eliminates numerous review comments. The concept design analysis should address all site aspects, and in particular storm water management and erosion and sedimentation control (designer should contact State and local government for their requirements) and the following:

1. Orientation: Architectural and Engineering Instructions, paragraph 5b, page 3-12, states, "Buildings will be oriented to take advantage of passive solar heating and cooling. Buildings eligible for air-conditioning should be sited so that the long axis of the building is in an east-west plane. Deviations are permitted where detailed solar studies indicate an alternate orientation is more energy efficient; where the topography does not allow proper orientation and there are no viable alternate sites; or where a building is to be heated by solar radiation and an alternate orientation is required for maximum solar exposure." Fully explain the building orientation in the design analysis.

2. Storm Drainage: Present the design of all new storm drainage and an analysis of the existing storm drainage to which the new will be connected, if applicable. The storm drain design is based on the 10-year storm frequency except for airfields where drainage is based on a 2-year storm frequency. Normally a 10-minute time of concentration is used for paved, and roof areas and a 20-minute time of concentration is for turfed areas. However this is a rule of thumb and times of concentration for each project should be calculated for the specific conditions. A Manning "n" value of 0.012 is normally used in the sizing of the storm drain piping. This may vary depending upon the type of pipe selected. The designer should choose a "c" value runoff coefficient based upon the surface conditions. A "c" of 0.95 for roof areas, 0.90 for paved areas and a range of 0.15 to 0.70 for wooded to turfed areas may be used. NABD Forms 1114 and 1115 are in Appendix A for use in the calculation of the storm drainage systems. It is not necessary to submit a complete storm drain design analysis at the concept stage of design. However, the design must be substantially developed in order to prepare a reasonable cost estimate.

3. Roof Drainage: Design the roof drainage system in accordance with the National Plumbing Code. Collection of all roof drain downspouts which discharge on to paved areas in an underground piping system is preferred in order to avoid icing problems for pedestrians in winter weather. Coordinate the interior roof drainage system with all other design disciplines so as to avoid conflict of piping with the HVAC, sprinkler, and structural components. In cold weather climates, special designs may be required if gutters and downspouts are used.

4. Sanitary Sewers: Provide a description of existing and proposed sanitary sewer facilities. The sanitary sewer should be designed to provide a minimum velocity of 2' per second when pipe is running full and 1.6' per second at average rate of flow. Above velocities can be reduced to 1.5' per second and 1.2' per second respectively in unfavorable terrain. Minimum service connection is 6" and minimum size of sewer between manholes is 8". For information on force mains, manholes, etc., see TM 5-814-1. Sizes for house connections (service lines) will be computed on a fixture unit basis. See TM 5-810-5, Plumbing. Design computations for the concept submittal should use the above for preparing sufficient calculations to determine new sanitary sewer requirements so that a reasonable cost estimate can be prepared. NOTE: Above design requirements are for the average sanitary sewer design in conjunction with building construction. For special designs such as sewage treatment plants and wash racks for Army vehicles see applicable Corps of Engineers manuals and discuss design requirements with Chief, Site Development Section, Design Branch.

5. Water Service and Fire Protection: Provide a description of existing and proposed water service and fire protection systems for the proposed facility. Adequacy of existing system and additions required to properly service and provide fire protection for the new facility should be included. As an initial step, available flow and pressure in the area should be determined. This can be accomplished by hydrant flow tests. The form for securing the flow information is in Appendix A. Contact the Design Team Leader to arrange for the flow tests by Post Fire Department. Use flow test data to determine residual pressure available for the required fire flow (exterior hose streams and sprinkler when provided). Generally, for normal domestic water service, use normal pressure (static) as pressure available. Sizes for building connections will be computed on a fixture unit basis. Resistivity tests should be conducted where metallic pipe will be allowed as a pipe option. See TM 5-813-5 on allowable pipe options for water lines.

6. Erosion and Sedimentation Control and Stormwater Management: Include a description of erosion and sediment control and storm water management requirements and how they will be designed. See paragraph VI of these requirements for the Baltimore District's policy on these two items.

7. Design for the Physically Handicapped: Design for the physically handicapped shall follow the guidance provided in the Uniform Federal Accessibility Standards (UFAS), dated April 1, 1988. In addition to meeting UFAS requirements as required by 42 U.S.C. 4151-4157 and consistent with 29 U.S.C. 794. The guidance contained in the Americans with Disabilities Act Accessibility Guidelines (ADAAG) of 1990 must also incorporate the ADAAG standards where more stringent (ADAAG) standards exist. However, the ADA guidance should not be the sole source of design direction. See Appendix A, Items A-7 and A-8 for official policy.

B. Drawings: Prepare all drawings on a Corps of Engineers standard mylars furnished by the Design Team Leader in accordance with ER 1110-345-710 and the following:

1. Survey Plan

2. Demolition Plan: Clearly indicate with a legend items to be removed, abandoned and relocated. An asbestos and lead paint survey should be conducted where demolition work is required.

3. Grading Plan: Information shown on this plan should include:

a. Existing topography including contours with sufficient spot elevations to establish existing ground surface in high and low areas. Existing buildings, roads, streets, parking areas, storm drains, sanitary sewers, water lines, gas lines, steam lines, etc., to remain from the survey. In addition, show and identify the base line and bench mark information.

b. New buildings, roads, parking facilities, etc.

c. New grading including the finish floor elevations for all new buildings and other structures with contours and/or spot elevations in sufficient detail to develop the drainage pattern as well as earthwork quantities. In order to provide drainage away from the new buildings, set the new grade approximately 0.5 feet below the new finished floor elevation and

drop an additional 0.5 feet in the first 10 feet from the building. Minimum desirable slopes are 2% for turfed areas and 1% for all paved areas. Maximum desirable slopes for turfed areas which will be regularly mowed is 3H to 1V. Utilize curbs or curbs and gutters around all parking areas and along all streets unless otherwise directed by the guidance provided by the user. When using metric, spot elevations shall be to the nearest 5.0 mm. Finish floor elevations shall be measured to the nearest 1.0 mm.

d. Indicate locations of all inlet, storm and sanitary manholes, water valve, electric manhole and other utility structures visible at grade on the plan. Do not show any new utility lines serving the utilities.

e. Show storm water management detention areas.

4. Utilities Plan: This plan should show all existing and new utilities including but not limited to sanitary sewers, force mains, water lines, storm drainage, roof drains, gas lines subdrainage, and foundation drains. All electrical and telephone lines are usually shown on the electrical utility plan. Show all new and existing buildings, roads, parking areas etc., but not contours or spot elevations. The plan should clearly present:

a. Existing and new sanitary sewers and force mains including manhole and cleanout locations. Size of all sanitary sewers and force mains should be shown. See TM 5-814-1 for technical guidance.

b. Existing and new water distribution and service lines with valves and fire hydrants indicated. Show sizes of all service and distribution lines. See TM-813-5 and TM 5-813-6 for technical guidance.

c. Existing and new storm drainage system and roof drainage with inlets, manholes, and headwalls indicated. Size of storm drains should be shown. See TM 5-820-4 for storm drainage technical guidance and the National Plumbing Code for roof drainage.

d. Show existing and new steam lines or gas line distribution and service lines with valves.

e. All utilities which are to be abandoned, relocated, or removed, sanitary, water and storm drainage piping to be abandoned shall be capped or plugged with a minimum of 1 foot of

concrete. If a demolition plan is included, demolition of utilities does not have to be shown on the utility plan.

5. Layout Plan: This plan should show all layout dimensions for all new features. Clearly identify all base lines used to layout the new work. The use of coordinates for locating new features is acceptable but not preferred over base line layouts. Depending upon the size of the project the layout data may be shown on the Utilities Plan. If the project has numerous utilities then prepare a separate layout plan to avoid congested drawings.

6. Legend: In order to assist in the preparation of the drawings, a typical legend for use on Baltimore District Corps of Engineers projects is enclosed for guidance in Appendix A.

7. Erosion and Sedimentation Control Plan: This plan should show all temporary erosion and sediment control measures for the construction activity. The plan shall be developed in accordance with paragraph 6 of this document.

C. Outline Specifications: Appropriate guide specifications should be selected and listed for the aspects of the project. A complete list of current Corps of Engineers guide specifications is available from the Specification Section through the Design Team Leader.

III. PRELIMINARY DESIGN REQUIREMENTS:

A. A preliminary design submission may be required in addition to the concept and final submissions for certain projects.

B. Drawings and design analysis should follow the requirements for final design with approximately 60 percent of the design completed.

C. Outline specifications are also required. The requirement is the same as provided in the concept submission.

IV. FINAL DESIGN REQUIREMENTS:

A. Design Analysis: The final design analysis is prepared the same as the concept design analysis but it is in much greater detail. Indicate all references and guidance used to develop the project such as data from Using Agency and Corps of Engineers technical manuals. In addition, fully explain any deviations from the Corps of Engineers criteria. The final design analysis should address all site aspects and in particular the following:

1. Storm Drainage: Describe storm drainage system and give basis for design referencing all criteria used. Include layout sketch of storm drainage areas with inlets and storm drainage piping shown. Calculate capacities of the various inlets selected for the project. Use NABD Form 1114 and include as part of the submission. Prepare storm drainage calculations indicating flow and velocity computations on NABD Form 1115 and include in the design analysis. Prepare and include roof drain computations. Draw a sketch of the roof areas showing drainage areas with locations and sizes of gutters, downspouts, and the roof drainage collector system. Include design calculations for the storm water management. See paragraph 6.

2. Water Service and Fire Protection: TM 5-812-1, TM 5-813-5 and TM 5-813-6. Describe proposed work, cite references, show all calculations including sketch of water system in vicinity of project. Be sure to note existing water storage facilities and capacities on Post and results of hydrant flow test.

3. Sanitary Sewers and Force Mains: TM 5-814-1. Describe proposed work, cite references, sketch of sanitary system, show all calculations including size of pumps, pump curves and strength of pipe selected.

B. Drawings: The final drawings are a continuation of the ones prepared for the concept submission.

1. Survey Plan.

2. Demolition: Indicate all items to be removed, abandoned, capped, plugged and relocated utilities.

3. Grading Plan: This plan must show new and existing contours and spot elevations in such detail that there will be no question regarding grading to provide positive drainage and indicated stormwater management facilities. Show inlets with top of frame elevations indicated, manholes, valves, hydrants, headwalls and all existing underground utilities. Do not show any new utility lines. Also, show any other features of work which will appear on the new ground surface.

4. Utilities Plan: Each existing and new utility must be clearly shown including building service connections and connections to existing lines. In addition, the locations of all new and existing fire hydrants, valves, manholes, inlets, etc., are required. Show the sizes of existing and new lines with new inlet and manhole numbers but elevations are not shown. A complete legend is required. All new piping, inlets, manholes, hydrants, etc., must be located by dimension from buildings, streets, etc. All roof drain piping to storm drains must also be shown. All storm drain piping for stormwater management must be included. In addition, subdrain piping for paved areas must be shown if required by the District Geotechnical Engineering Branch.

5. Layout Plan: This is a complete layout showing existing and new buildings, roads, streets, walks, parking and service areas, etc. Do not show any new or existing contours or spot elevations. Clearly identify the baseline information from which all new facilities are to be located. Layout must be complete with all dimensions in feet and decimals of a foot. Where metrics are used, dimensions shall be shown in meters. Stationing and curve data are required for road or street layout where applicable. Include a complete legend. The layout information may be combined with the utilities plan in those instances where the end result will not be too cluttered.

6. Profiles:

a. Profiles for storm drains, sanitary sewers, and force mains are always required in those instances where each utility crosses numerous new or existing utilities and the possibility for conflicts are very likely to occur. Profiles for water lines may be required if there are many utility crossings along its alignment. Utility profiles must show:

1. Existing and finished grade.

2. Manholes, inlets, headwalls, etc., with numeric designations (corresponding to those shown on utility plan).

3. Top and invert elevations.

4. Size, length, and slopes of all lines.

5. All existing and new utility crossings.

6. Type of structures (i.e., Type "E" inlet, Std. MH, etc.) required at each junction.

b. Profiles for roads, streets, etc., must show:

1. Existing and finished grade with all vertical alignment geometric data shown.

2. All new and existing utility crossings.

c. All profiles should be drawn on compatible scales. 1" = 30', 40', or 50' horizontal corresponding to 1" = 3', 4' or 5' vertical. The vertical scale may vary where profiles transverse very steep topography. Profiles in metrics shall be drawn in compatible scales: 1:100, 1:200, 1:500 or 1:1000 horizontal scales, and 1:50 and 1:100 vertical scales.

7. Details: Standard details for storm drainage, water, sanitary sewer, and miscellaneous site features shall comply with the Department of Public Work's criteria such as Installation Design Guides or, if none are available, use the respective State highway and drainage standard details. Request the standard detail sheets through the Design Team Leader. The designer has the option to develop any or all details for the project. Special details for specific situations will have to be prepared by the designer.

C. Specifications: Final technical specifications are prepared by editing Corps of Engineers Guide Specifications to reflect the specific features of the particular project being designed. Where Corps of Engineers specifications are not available, the AE shall prepare specifications to reflect required features.

V. FOUNDATION DRAINAGE SYSTEM: Foundation drains are required for all projects with basements or habitable spaces below grade. A standard detail is included in Appendix A for guidance. Design foundation drains to discharge by gravity or mechanical means to a positive outfall such as a drainage ditch or to a storm drainage system. Waterproofing or dampproofing of walls is as required by the Corps of Engineers architectural criteria.

VI. EROSION AND SEDIMENTATION CONTROL, STORM WATER MANAGEMENT, AND NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT:

A. The Architect-Engineer is responsible for preparing both erosion and sedimentation control plans and stormwater management plans during design. Each shall be in accordance with the criteria of the governing agency at the project site. The Architect-Engineer shall, in the early stages of design, contact the state, county, or local authorities as to their particular requirements for each item. The Baltimore District's policy is to incorporate erosion and sedimentation control in all projects and stormwater management where required. If stormwater management is not required, detailed documentation is required in the design analysis.

B. For projects within the State of Maryland, the Architect-Engineer shall submit the erosion and sedimentation control and stormwater management documentation to the Maryland Department of the Environment for review. For projects with other states, the Architect-Engineer shall determine if submissions of the documentation is required. The reason for individual determination for state and jurisdictions outside of Maryland is due to the fragmented nature of policies in existence.

C. It is the responsibility of the Architect-Engineer to make all submissions for review in a timely manner. Each should be scheduled to allow the reviewing authority to make comments and request resubmission. The Architect-Engineer is required to inform the Design Team Leader of the status of the review and any difficulties encountered.

D. The Architect-Engineer shall place all erosion and sedimentation control notes, directions, details, etc., on the design drawings. Specification NAB 01561, ENVIRONMENTAL PROTECTION, will refer to the plans and will provide any additional guidance or direction.

E. All submissions of erosion and sediment control and stormwater management plans for review and approval must be accompanied by a completed NPDES permit. Consult the local governing authority which is responsible for jurisdiction at the project location for guidance pertaining to the NPDES permit.

VII. WETLANDS: Some projects are sited in areas of wetlands. Such occurrences may or may not be stated in the design documents such as the PDB (Project Development Brochure) and the DD 1391. Whether indicated or not it is the responsibility of the Architect-Engineer to visually observe the project site to determine the existence of wetlands. The identification must be performed by personnel experienced in working with wetlands. In those instances when wetlands are indicated in the design documents and will be affected by the project, the requirements of DR 1145-1-3, Civil Regulatory Functions, Department of the Army Permits for Military and Civil Construction Activities, will be followed. However, for the projects where wetlands were not previously identified, notify the Design Team Leader immediately. A decision will be made whether to proceed with the design or resite the project. If the project proceeds and wetlands are affected, then the requirements of DR 1145-1-3 will be followed. Your early attention to the wetland subject is strongly recommended.

VIII. SPECIAL CONSIDERATIONS:

A. In general, all inlets placed in paved areas subject to frequent use by the public must incorporate "bicycle safe" frame grates.

B. The design of underground steam distribution lines requires coordination of the placement of new lines with existing underground utilities. In order to ensure that the proper guidance is received prior to initiation of design, a predesign meeting must be scheduled between the designers and Engineering Division, Design Branch personnel. Request all meetings through the Design Team Leader.

C. Always attempt to collect roof drainage downspouts which discharge onto paved walkways and/or roadways in an underground storm drainage system. This will prevent ice forming and presenting a safety hazard during winter weather.

APPENDIX A: The appendix has various items to assist in the design of the project and the preparation of the contract plans and specifications. The appendix will be updated periodically.

APPENDIX A

Index

1. Commissary Store Parking Requirements for Handicapped Persons. Engineering Improvement Recommendation System (EIRS) Bulletin 79-04.
2. Dimensions of Typical POV Parking Areas EIRS Bulletin 82-03.
3. Grading for Typical POV Parking Areas EIRS Bulletin 82-03.
4. ETL 1110-3-278, U.S. Army Reserve Center Design for the Physically Handicapped.
5. Hydrant Flow Test Form.
6. Accessibility and Usability for the Physically Handicapped. Engineering Improvement Recommendation System (EIRS) Bulletin 92-10
7. Memorandum: The Americans with Disabilities Act (ADA), CEMP-EA, 4 March 1992
8. Baltimore District Typical Legend.
9. NABD Form 1114.
10. NABD Form 1115.
11. Typical Foundation Drainage for Exterior Walls Detail

ENGINEERING AND DESIGN

Commissary Store Parking Requirements for Handicapped Persons:

a. Problem: EM 1110-1-103, Design for the Physically Handicapped, provides criteria to make Army facilities accessible to the physically handicapped. EM 1110-1-103, Chapter 4, requires parking for the physically handicapped to be located within 100 feet of a barrier-free building entrance without crossing a driveway. It is usually very difficult to apply these criteria to commissary stores for several reasons.

(1). Commissary stores have only one centrally located building entrance for control purposes.

(2). There is an operational requirement to use the entire area adjacent to the building entrance as a vehicular loading zone.

(3). Commissary stores require a relatively high number of parking spaces to be provided for both handicapped patrons and employees.

b. Probable Solution: The 100-foot maximum distance requirement of EM 1110-1-103 is hereby waived for commissary stores. Parking for the handicapped will be provided as close as reasonably possible to the main building entrance. Barrier-free access will be provided from the handicapped parking area to the building entrance by a direct route. If it becomes necessary for handicapped persons to cross driveways, the provisions of EM 1110-1-103, Chapter 4, will apply for crosswalks. All other provisions of EM 1110-1-103 remain in effect.

ENGINEERING AND DESIGN

Dimensions for Typical POV Parking Areas:

a. Problem: Privately owned vehicle (POV) parking criteria in use throughout the Corps of Engineers is based on TM 5-803-5, dated March 1981, which recently superseded TM 5-822-3, dated July 1965. Parking stalls are required to be 9 x 17 feet where overhang access and 9 x 19 feet without overhang. Aisles and access lanes are 25 feet wide.

Due to the rapidly decreasing length of the American cars and the increasing use of small imports, the criteria in TM 5-803-5, although an improvement over the old criteria contained in TM 5-822-3, need to be revised to meet the trends in modern cars.

b. Solution: The criteria to be used are as follows:

(1). Stall dimensions will be 9 x 16 feet where overhang occurs, and 9 x 18 feet without overhang. Aisles and access lanes will be 24 feet wide.

(2). Planting islands for 90 degrees parking, where required, will be 12 x 36 feet.

(3). Existing criteria for angled parking will continue to be used, except that planting islands may be reduced in size to closely approximate the reduced gross sq. ft. of 90 degrees planting islands.

(4). This interim guidance will be used until POV parking design can be thoroughly evaluated and is authorized for immediate implementation for those projects under design which can be modified with no increase in cost or delay in completion dates.

ENGINEERING AND DESIGN

Grading for Typical POV Parking Areas:

a. Problem: There is no guidance establishing site grading for POV parking areas. The FOAs are requiring this guidance in the development of their projects.

b. Solution: Pending revision of TM 5-803-5, the interim guidance stated herein is authorized for routine implementation as defined in paragraph 6c, ER 1110-345-100. Site grading will be designed to provide adequate surface drainage with a minimum construction cost. The slopes of the surfaced area will be held to the minimum required for drainage, but will not be less than 1 percent. For safety, the maximum desirable slopes for areas to be laid out for 90-degree parking are 8 percent along the aisles, through the area and 1-1/2 percent for the transverse slope. For areas to be laid out for 60- and 45-degree parking, the desirable slopes are 5 percent along the aisles, through the area and 1 percent for the transverse slope.

DEPARTMENT OF THE ARMY
Office of the Chief of Engineers
DAEN-MCE-A
Washington, D.C. 20314

Engineering Technical
Letter 1110-3-278

5 December 1977

Engineering and Design
U.S. ARMY RESERVE CENTERS
DESIGN FOR THE PHYSICALLY HANDICAPPED

1. Purpose. This letter provides design guidance to make the U.S. Army Reserve Centers accessible to the physically handicapped.

2. Applicability. This letter applies to all OCE elements and field operating agencies having military construction design responsibility.

3. Guidance. The Deputy Assistant Secretary of Defense (Installations and Housing (DASD(I&H))), has determined that U.S. Army Reserve Centers (USARC) are generally limited in use to able-bodied military personnel and therefore not subject in their entirety to the mandatory provisions of P.L. 90-480 as amended. DASD(I&H) established that, as a minimum, provisions will be made to ensure access by the physically handicapped to the ground floor of USARC. Minimum provisions, except for maintenance facilities, will include the following in accordance with EM 1110-1-103:

a. One automobile parking stall convenient to the main entrance.

b. Access ramps and/or depressed curbs from parking areas to main entrance doors of adequate width to accommodate physically handicapped persons.

c. Toilet facilities on the ground floor for men and women designed to accommodate the physically handicapped.

Other provisions for the physically handicapped as described in EM 1110-1-103 will be considered and incorporated into the design and construction of USARC, including maintenance facilities, where such can be accomplished without additional cost.

4. Action To Be Taken. U.S. Army Reserve Centers will be designed to be accessible to the physically handicapped in accordance with the guidance provided above. Records which certify compliance with the guidance herein will be kept in the permanent project files. Responsibilities for record keeping will be as stated in paragraph 6 of ER 1110-1-102.

HYDRANT FLOW TEST

<u>Hydrant Number</u>	<u>Static Pressure P.S.I.</u>	<u>Flow Pressure P.S.I.</u>	<u>Flow G.P.M.</u>	<u>Residual Pressure P.S.I.</u>
A		X	X	
B	X			X
C		X	X	

1. Read static pressure at hydrant B.
2. Flow hydrants A and C, simultaneously.
3. Read flow pressure at hydrants A and C.
4. Measure orifice flowed at hydrants A and C.
5. At same time hydrants A and C are flowing, read residual pressure at hydrant B. Check orifice friction coefficient.
6. Indicate Post hydrant numbers for all hydrants.
7. See attached sketch for location of hydrants.

ENGINEERING AND DESIGN

Accessibility and Usability for the Physically Handicapped:

a. Problem: Several standards pertaining to facilities which will be used by the physically handicapped exist, and guide specifications do not all reference the same standard. The "Uniform Federal Accessibility Standards" (UFAS), Fed Std 795, was developed as a result of the Architectural Barriers Act. In keeping with the objective of uniformity of standards between Federal requirements and those commonly applied by state and local governments, the UFAS follows the American National Standards Institute (ANSI) document A117.1, "Providing Accessibility and Usability for Physically Handicapped People" which is a generally accepted private sector standard referenced in building codes and Federal design standards. The UFAS parallels the ANSI A117.1 in format and basic technical content but also contains requirements for minimum number of elements such as number of phones required for the handicapped and minimum number of spaces, such as parking spaces or seating accessible to the handicapped. The UFAS standards have been implemented by a DOD memorandum. It should also be noted that the Americans with Disabilities Act (ADA) of 1990 does not apply to Federal projects.

b. Probable Solution: The guide specifications which presently referenced A117.1 will be changed to reference the Fed Std 795, Uniform Federal Accessibility Standards (UFAS).